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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/827,379	04/20/2004	Eric R. Fossum	M4065.0628/P628-B	3781
24998	7590	06/13/2005	EXAMINER	
DICKSTEIN SHAPIRO MORIN & OSHINSKY LLP			PIZARRO CRESPO, MARCOS D	
2101 L Street, NW			ART UNIT	
Washington, DC 20037			PAPER NUMBER	
			2814	

DATE MAILED: 06/13/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

Application No.

10/827,379

Applicant(s)

FOSSUM, ERIC R.

Examiner

Marcos D. Pizarro-Crespo

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 20 April 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 35-48 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 35-48 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 20 April 2004 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date <u>10/18/04, 4/20/04</u> . | 6) <input type="checkbox"/> Other: _____  |

Attorney's Docket Number: M4065.0628/P628-B

Filing Date: 4/20/2004

Claimed Priority Date: 8/29/2002 (Continuation of 10/230,079)

Applicant(s): Fossum

Examiner: Marcos D. Pizarro-Crespo

### DETAILED ACTION

This Office action responds to the preliminary amendment filed on 4/20/2004.

#### *Acknowledgment*

1. The preliminary amendment filed on 4/20/2004 has been entered. The present Office action is made with all the suggested amendments being fully considered. Accordingly, pending in this Office action are claims 35-48.

#### *Drawings*

2. Figure 1 should be designated by a legend such as --Prior Art-- because only that which is old is illustrated. See MPEP § 608.02(g).

3. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(4) because reference characters **145** (see, e.g., par.43/II.15) and **147** (see, e.g., fig. 8) have both been used to designate the same barrier potential.

4. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they do not include the following reference sign(s) mentioned in the description (see, e.g., par.47/II.12) with respect to figure 10: **657**.

5. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(4) because reference characters **654** (see, e.g., par.0047/II.14) and **600** (see, e.g., fig. 10) have both been used to designate the same processor.

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6. Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement-drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the examiner does not accept the changes, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

### ***Specification***

7. The disclosure is objected to because of the following informalities:

The current status of the parent application was not included in the preliminary amendment to the specification. A statement reading: "This application is a continuation of application ser no. 10/230,079, filed 8/29/2002, now U.S. Patent no. 6744084." should be entered following the title of the invention or as the first sentence of the specification.

8. Appropriate correction is required.

### ***Claim Rejections - 35 USC § 112***

9. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter that the applicant regards as his invention.

10. Claims 37, 40, 41, 43 and 48 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

11. Claim 37 recites the limitation "said extended source follower transistor" in line 7. There is insufficient antecedent basis for this limitation in the claim.

12. Claim 40 recites the limitation "said second conductivity type" in line 2. There is insufficient antecedent basis for this limitation in the claim.

13. Claim 43 recites the limitation "said voltage source" in lines 2-3. There is insufficient antecedent basis for this limitation in the claim.

14. Claim 48 recites the limitation "said first dopant concentration" in line 2. There is insufficient antecedent basis for this limitation in the claim.

***Claim Rejections - 35 USC § 102***

15. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

16. Claims 35, 36, 38, and 40 are rejected under 35 U.S.C. 102(e) as being anticipated by Zhao (US 6339248).

17. Regarding claim 35, Zhao (see, e.g., fig. 8) shows all aspects of the instant invention including a pixel comprising:

- ✓ A substrate **101**
- ✓ A photoconversion device fabricated in the substrate **101**
- ✓ A charge collection region **103** of the device
- ✓ A reset region **123** of a first conductivity type in the substrate **101** and coupled to the collection region **103** for resetting the collection region in response to a signal applied to the reset region (see, e.g., col.5/ll.30-34)

18. Regarding claim 36, Zhao shows the reset region **123** and the collection region **103** both forming an extended charge collection region (see, e.g., fig. 8), the extended charge collection region also being reset by the applied signal (see, e.g., col.5/ll.30-34).

19. Regarding claim 38, Zhao shows the pixel further comprising a pulsed voltage source periodically resetting the reset region and the charge collection region (see, e.g., col.5/ll.30-34).

20. Regarding claim 40, Zhao shows the first conductivity type is n-type (see, e.g., fig. 8). Zhao also shows the pixel comprising regions **131** of p-type conductivity.

### ***Claim Rejections - 35 USC § 103***

21. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

22. Initially, and with respect to claims 37 and 42, note that a limitation in a claim with respect to the manner in which a claimed device is intended to be used does not differentiate the claimed device from a prior-art device if the prior-art device teaches all

structural limitations in the claims and the functional limitations are found to be inherent in the prior art device. *In re Schreiber*, 128 F.3d 1473, 1477-78, 44 USPQ2d 1429, 1431-32 (Fed. Cir. 1997); *Ex parte Masham*, 2 USPQ2d 1647 (Bd. Pat. App. & Inter. 1987). See *Hewlett-Packard Co. v. Bausch & Lomb Inc.* and the related case law cited therein which makes it clear that it is the final product *per se* which must be determined in a device claim, and not the patentability of its functions (909 F.2d 1464, 1469, 15 USPQ2d 1525, 1528 (Fed. Cir. 1990)). As stated in *Best*,

Where the claimed and prior art products are identical or substantially identical in structure or composition, a *prima facie* case of either anticipation or obviousness has been established. *In re Best*, 562 F.2d 1252, 1255, 195 USPQ 430, 433 (CCPA 1977).

23. **Note that the applicant has burden of proof** once the examiner establishes a sound basis for believing that the products of the applicant and the prior art are the same. See *In re Spada*, 911 F.2d 705, 709, 15 USPQ2d 1655, 1658 (Fed. Cir. 1990).

24. Claims 37 and 42, 43, and 45 are rejected under 35 U.S.C. 103(a) as being unpatentable over Zhao in view of Chen (US 6392263).

25. Regarding claim 37, Zhao shows most aspects of the instant invention (see, e.g., paragraphs 17 and 18 above) including:

- ✓ A source follower transistor **151** for outputting a signal representing charge collected in the extended collection region
- ✓ A row select transistor **153** for selectively outputting a signal from the source follower transistor **151**

Zhao also shows the source follower transistor **151** in electrical communication with the reset region **123**, but fails to show a capacitor in electrical communication with the reset channel region **123** and the source follower transistor **151** for storing charge collected in the collection region. Chen, however, teaches that doing so would reduce the charge injection effect of Zhao's reset switch (see, e.g., col.6/ll.59-61).

It would have been obvious at the time of the invention to one of ordinary skill in the art to include a capacitor in electrical communication with the reset region and the source follower transistor, as suggested by Chen, to reduce the charge injection effect of Zhao's reset switch.

26. In reference to the language in claim 37 referring to the function of the capacitor, it is noted that Zhao/Chen show all aspects of the semiconductor device according to the claimed invention (see paragraph 25 above) and that using the capacitor to store charge collected in the collection region is a function that does not affect the structure of the final device. Furthermore, Zhao/Chen's device performs the claimed functions. That is, the carriers generated by the incoming light detected by the photodiode will be stored at the capacitor since one of its plates is directly connected to the photodiode node.

27. Regarding claim 42, Zhao (see, e.g., fig. 8) shows most aspects of the instant invention including a pixel for use in an imaging device, the pixel consisting essentially of:

- ✓ A charge collection region **103**



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- ✓ A reset region **123** adjacent the charge collection region **103** for periodically resetting a charge level of the collection region **103** in response to an applied reset signal (see, e.g., col.5/ll.30-34)
- ✓ A source follower transistor **151** for outputting a signal representing charge collected in the collection region **103**
- ✓ A row select transistor **153** for selectively outputting a signal from the source follower transistor **151**

Zhao also shows the source follower transistor **151** in electrical communication with the reset region **123**, but fails to show a capacitor in electrical communication with the reset channel region **123** and the source follower transistor **151** for storing charge collected in the collection region. Chen, however, teaches that doing so would reduce the charge injection effect of Zhao's reset switch (see, e.g., col.6/ll.59-61).

It would have been obvious at the time of the invention to one of ordinary skill in the art to include a capacitor in electrical communication with the reset region and the source follower transistor, as suggested by Chen, to reduce the charge injection effect of Zhao's reset switch.

28. In reference to the language in claim 42 referring to the function of the capacitor, it is noted that Zhao/Chen show all aspects of the semiconductor device according to the claimed invention (see paragraph 27 above) and that using the capacitor to store charge collected in the collection region is a function that does not affect the structure of the final device. Furthermore, Zhao/Chen's device performs the claimed functions. That is, the carriers generated by incoming light detected by the photodiode will be

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accumulated at the capacitor since one of its plates is directly connected to the photodiode node.

29. Regarding claim 43, Zhao shows the reset region **123** and the collection region **103** both forming an extended charge collection region (see, e.g., fig. 8). Zhao also shows (see, e.g., col.5/ll.30-34) a voltage source resetting the extended collection region.

30. Regarding claim 45, Zhao shows the reset region **123** is doped with an n-type dopant at a first dopant concentration (see, e.g., fig. 8).

31. Claim 39 is rejected under 35 U.S.C. 103(a) as being unpatentable over Zhao in view of Kochi (US 6670990).

32. Regarding claim 39, Zhao shows most aspects of the instant invention (see, e.g., paragraphs 17-19 above), except for the voltage source coupled to one terminal of a capacitor, the other terminal of which is coupled to the extended charge collection region. Kochi, on the other hand, teaches that doing so would enable Zhao's source follower to operate linearly, *i.e.*, to output a voltage in proportion to the input voltage (see, e.g., col.16/ll.12-14 and col.2/ll.48-50). This would avoid signal deterioration associated with input/output linearity problems in low luminosity regions (see, e.g., col.3/ll.7-8).

It would have been obvious at the time of the invention to one of ordinary skill in the art to include a capacitor having one terminal coupled to Zhao's voltage source and the other terminal coupled to the extended charge collection region, as suggested by

Kochi, to avoid input/output linearity deterioration of the source follower in low luminosity regions.

33. Claims 41 and 44 are rejected under 35 U.S.C. 103(a) as being unpatentable over Zhao/Chen in view Dasgupta (US 6146939).

34. Regarding claims 41 and 44, Zhao/Chen show most aspects of the instant invention (see, e.g., paragraphs 25 and 28 above) including a capacitor in electrical communication with the reset region and the source follower transistor. As taught by Dasgupta, every capacitor has a capacitance per unit area associated with it. This capacitance may range from 4.3-5.3 fF/ $\mu\text{m}^2$  depending on the choice and thickness of the capacitor dielectric (see, e.g., Dasgupta, col.1/ll.37 and col.3/ll.13-19). Zhao/Chen, however, fail to specify that the capacitance per unit area of the capacitor is between about 5-10 fF/ $\mu\text{m}^2$ . However, the specific capacitance values claimed will not support the patentability of subject matter encompassed by the prior art unless there is evidence indicating such values are critical. "Where the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the workable ranges by routine experimentation". *In re Aller*, 220 F.2d 454,456,105 USPQ 233, 235 (CCPA 1955).

Since the applicant has not established the criticality (see next paragraph) of the capacitance values claimed, and since these values are in common use in similar devices in the art, as taught by Dasgupta, it would have been obvious to one of ordinary skill in the art to use these values in the device of Zhao/Chen.

#### CRITICALITY

35. The specification contains no disclosure of either the critical nature of the claimed mole ratio or any unexpected results arising therefrom. Where patentability is said to be based upon particular chosen dimensions or upon another variable recited in a claim,

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the applicant must show that the chosen dimensions are critical. *In re Woodruff*, 919 F.2d 1575, 1578, 16 USPQ2d 1934, 1936 (Fed. Cir. 1990).

36. Claims 46-48 are rejected under 35 U.S.C. 103(a) as being unpatentable over Zhao/Chen in view of Wada (US 6677676).

37. Regarding claims 46-48, Chen shows the capacitor **450** is connected to the reset region **307** through an n-type contact region having a second dopant concentration (see, e.g., fig. 4). Chen also shows the second dopant concentration **307** is higher than a first dopant concentration **405**. Chen, however, fails to show the contact region having a higher concentration than the reset region **123**. Wada, on the other hand, teaches that doing so would establish a good electrical connection between the capacitor and the reset region (see, e.g., col.12/ll.28-31).

It would have been obvious at the time of the invention to have Zhao/Chen's contact region having a higher concentration than the reset region, as suggested by Wada, to establish a good electrical connection between the capacitor and the reset region.

### ***Conclusion***

38. Papers related to this application may be submitted directly to Art Unit 2814 by facsimile transmission. Papers should be faxed to Art Unit 2814 via the Art Unit 2814 Fax Center. The faxing of such papers must conform to the notice published in the Official Gazette, 1096 OG 30 (15 November 1989). The Art Unit 2814 Fax Center number is **(703) 872-9306**. The Art Unit 2814 Fax Center is to be used only for papers related to Art Unit 2814 applications.

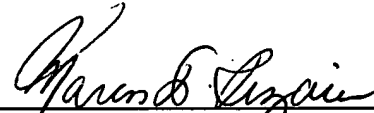
39. Any inquiry concerning this communication or earlier communications from the examiner should be directed to **Marcos D. Pizarro-Crespo** at **(571) 272-1716** and between the hours of 9:30 AM to 8:00 PM (Eastern Standard Time) Monday through Thursday or by e-mail via [Marcos.Pizarro@uspto.gov](mailto:Marcos.Pizarro@uspto.gov). If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Wael Fahmy, can be reached on (571) 272-1705.

40. Any inquiry of a general nature or relating to the status of this application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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41. The following list is the Examiner's field of search for the present Office Action:

Field of Search	Date
U.S. Class / Subclass(es): 257/59,72,222,223,225,228-234,290-294,431-466	6/9/05
Other Documentation: PLUS Analysis	6/9/05
Electronic Database(s): EAST (USPAT, EPO, JPO)	6/9/05



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